

牙體形態學
Dental morphology

Morphology of Canines

臺北醫學大學 牙醫學系
董德瑞老師
drdong@tmu.edu.tw

學習目標

能辨識及敘述牙齒之形態、特徵與功能意義，並能應用於臨床診斷與治療

1. 牙齒形態相關名辭術語之定義與敘述
2. 牙齒號碼系統之介紹
3. 牙齒之顎間關係與生理功能形態之考慮
4. 恒齒形態之辨識與差異之比較
5. 乳齒形態之辨識與差異之比較
6. 恒齒與乳齒之比較
7. 牙髓腔形態
8. 牙齒之萌出、排列與咬合
9. 牙體形態學與各牙科臨床科目之相關
10. 牙科人類學與演化發育之探討

參考資料

1. Woelfel, J.B. and Scheid, R.C: Dental Anatomy--Its Relevance to Dentistry, ed. 6, Lippincott Williams & Wilkins, Philadelphia, 2002.
2. Jordan, R.E. and Abrams, L.: Kraus' Dental Anatomy and Occlusion, ed. 2, Mosby Year Book, St. Louis, 1992.
3. Ash, M.M. and Nelson, S.J.: Wheeler's Dental Anatomy, Physiology and Occlusion, ed. 8, W.B. Saunders Co., 2003.

Summary

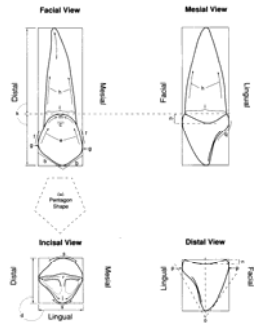
The course of Dental Morphology provides the student with knowledge in the morphological characteristics of the teeth and related oral structures upon which a functional concept of intra-arch relationships may be based for the clinical application to patient assessment, diagnosis, treatment planning, and oral rehabilitation.

Topics

- I. General description of canines
 - A. Functions
 - B. General characteristics or class traits (similarities) of canines (both maxillary and mandibular)
- II. Arch traits for canines: how to distinguish Maxillary from mandibular canines (from each view)
 - A. Canines from the labial view
 - B. Canines from the lingual view
 - C. Canines from the proximal views
 - D. Canines from the incisal view
- III. Variations in canine teeth

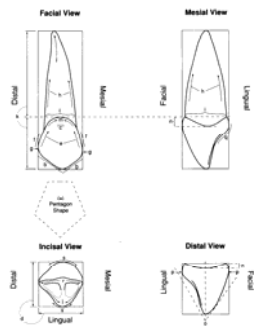
General Characteristics of All Canines (Class Traits)

- a. Crowns are pentagon shaped (facial views)
- b. Cusps have mesial ridges shorter than distal ridges (facial views).
- c. Vertical labial ridges are prominent (more so on maxillary canines) (facial views).
- d. Crowns are wider faciolingually than mesiodistally (similar to mandibular incisors) (incisal views).

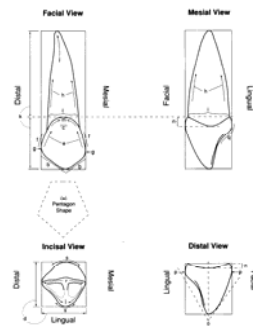


General Canine Characteristics Similar to Incisors

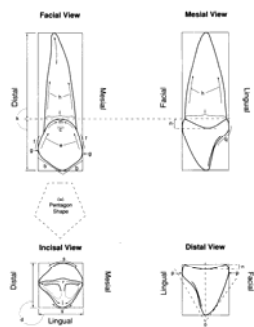
- e. Crowns taper from contact areas to cervical line (facial views).
- f. Crown outlines are more convex on the distal and flatter on the mesial (facial views).



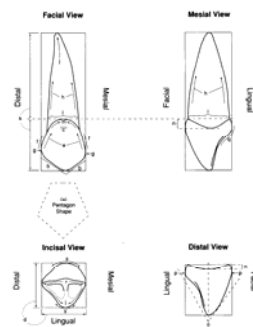
- g. Mesial contact areas are located in the incisal third of the crown; distal contact areas are more cervically positioned (facial views).
- h. Roots taper from the cervical line toward the apex (facial and proximal views), and from facial toward lingual (which is best viewed on an actual tooth or model).



- i. Roots are wider faciolingually than mesiodistally (compare proximal to facial views).
- j. When bent, roots more often bend toward the distal in the apical third (facial views).



- k. Roots are considerably longer than crowns (facial views).
- l. Crowns taper from the proximal contacts toward the lingual (incisal views), so the mesial and distal marginal ridges converge toward the cingulum (incisal views).



m. Cervical lines on the facial (and lingual) surfaces are convex (curve) toward the apex (facial and lingual views).

n. Proximal cervical lines are convex (curve) toward the incisal, more so on the mesial than on the distal surface (proximal views).

o. Canines (like incisors) are wedge-shaped when viewed from the proximal.

p. Facial and lingual crests of curvature are in the cervical third (proximal views).

q. Lingual outlines are "S" shaped with a concave lingual fossa and convex cingulum; the marginal ridges are oriented more vertically than horizontally (proximal views).

r. Incisal edges run toward the mesial to the distal contact areas (incisal views).

s. Facial outlines are less convex (broader) than lingual outlines (incisal views).

Type (and Arch) Traits That Distinguish the Maxillary Canine from the Mandibular Canine

a. Both maxillary and mandibular canine crowns are oblong with the mesiodistal dimension less than the incisocervical dimension, but the mesiodistal dimension of mandibular canines is more narrow than on maxillary canines (facial views).

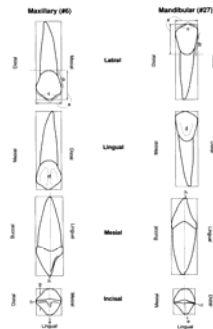
b. Maxillary canines have mesial crown contours convex to fiat cervically versus mandibular canines which have mesial crown contours more in line with the contour of the root (facial views).

c. The angles of the cusp slopes for maxillary canines are more acute and average about 105° versus the broader angle in the mandibular canine which averages 120° (facial views).

d. Lingual ridges with mesial and distal fossae are less prominent on mandibular canines than maxillary canines (lingual views).

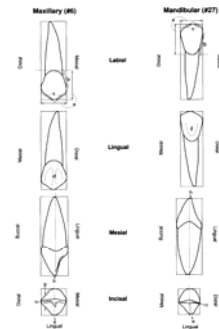
e. Cingula on maxillary canines are large and centered mesiodistally. On mandibular canines they are often slightly to the distal (incisal views).

f. Incisal ridges on maxillary canines are straighter mesiodistally. On mandibular canines the distal cusp ridge bends distolingually (incisal views).



g. The distal half of the crown of maxillary canines is compressed (squeezed) faciolingually more than on mandibular canines (incisal views).

h. The cusp tip of the maxillary canine is on or labial to the root axis line whereas the mandibular cusp tip is lingual to this line (proximal and incisal views).



OBJECTIVES

This section is designed to prepare the learner to perform the following:

- ~ Describe the functions of canines.
- ~ List the class traits that apply to all canines. Include the incisor class traits that also apply to the canines.
- ~ From a selection of all permanent teeth (or from drawings or photographs of all teeth from various views), select and separate out the canines.

The four canines are justifiably considered cornerstones of the arches, as they are located at the corners of the mouth or dental arches. They are often referred to as cuspids, eyeteeth, and fangs (nicknames and slang terminology). The use of such slang terminology should be discouraged. Frequently, the canines are the last teeth to be lost from dental disease (decay and/or periodontal problems). Have you known or seen an elderly person who is edentulous (toothless), except for one or more of the canines?

The name canine is of Greek origin and is found in the writings of Hippocrates and Aristotle of 2350 years ago. Aristotle first described canine anatomy, stressing the intermediate nature of it between incisors and molars: it is sharp like an incisor but broader at the base like a molar. Celsus was the first writer to mention the roots of teeth, saying the canine was monoradicular (that is, normally having one root).

A. FUNCTIONS

In dogs, cats, and other animals with long, prominent canine teeth, the functions of these teeth are catching and tearing food and defense. As a matter of fact, caninus in Latin means "dog." Canines are essential to their survival. In human beings, these teeth usually function with the incisors (a) to support the lips and the facial muscles and (b) to cut, pierce, or shear food morsels. A steep overlap of the maxillary and mandibular canines, when present, serves as (c) a protective mechanism since the longer, opposing canines ride up over each other when the mandible moves to either side, causing all of the posterior teeth to separate (disocclude). This canine guidance (also known as canine-protected occlusion) relieves the premolars and molars from potentially damaging horizontal forces while chewing.

Canines, because of their large, long roots, are good anchor teeth (abutments) for a fixed dental bridge or removable partial denture attachments (clasps) when other teeth have been lost. As such, they often continue to function as a prime support for the replacement teeth for many years.

B. GENERAL CHARACTERISTICS OR CLASS TRAITS (SIMILARITIES) OF CANINES (BOTH MAXILLARY AND MANDIBULAR)

1. SIZE OF CANINES

On average, canines are the longest teeth in each arch, and the maxillary canine is the longest tooth in the mouth even though the mandibular canine crown is longer than the maxillary canine crown. (One text states that the mandibular canine crown is the longest crown in the mouth.) They have particularly long roots [average: 16.2 mm] and thick roots (faciolingually) that help to anchor them securely in the alveolar process. [Table 5-1](#) provides all canine dimensions.

B. GENERAL CHARACTERISTICS OR CLASS TRAITS (SIMILARITIES) OF CANINES (BOTH MAXILLARY AND MANDIBULAR)

2. INCISAL RIDGES AND CUSPTIPS OF CANINES

The incisal ridges of a canine, rather than being nearly straight horizontally like the incisors, are divided into two inclines called the mesial and distal cusp ridges (also called cusp slopes or cusp arms). Subsequently, canine crowns from the facial view resemble a five-sided pentagon ([Appendix 3a](#)). The mesial cusp ridge is shorter than the distal cusp ridge ([Appendix 3b](#)). In older individuals, the lengths of the cusp ridges are often altered by wear (attrition). Canine teeth do not ordinarily have mamelons but may have a notch on either cusp ridge, as seen clearly in [Figure 5-2](#).

B. GENERAL CHARACTERISTICS OR CLASS TRAITS (SIMILARITIES) OF CANINES (BOTH MAXILLARY AND MANDIBULAR)

3. LABIAL CONTOUR OF CANINES

The labial surface of a canine is prominently convex with a vertical labial ridge ([Appendix 3c](#)). Canines are the only teeth with a labial ridge, although premolars have a similar-looking ridge called a buccal ridge.

B. GENERAL CHARACTERISTICS OR CLASS TRAITS (SIMILARITIES) OF CANINES (BOTH MAXILLARY AND MANDIBULAR)

4. CROWN PROPORTIONS OF CANINES

The measurement of a maxillary or mandibular canine crown is greater labiolingually than it is mesiodistally [on maxillary canines by 0.5 mm and on mandibular canines by 0.9 mm; averages from 637 teeth] ([Appendix 3d](#)). Recall that this proportion (greater labiolingually than mesiodistally) also applied to both types of mandibular incisors. The root cervix measurements are even more oblong faciolingually [greater faciolingually by 2.0 mm on maxillary canines and 2.3 mm on mandibular canines]. (Compare the facial and mesial views in [Appendix 3i](#).)

B. GENERAL CHARACTERISTICS OR CLASS TRAITS (SIMILARITIES) OF CANINES (BOTH MAXILLARY AND MANDIBULAR)

5. CANINE TRAITS THAT ARE SIMILAR TO INCISOR TRAITS

Similar to most incisors (EXCEPT the mandibular central, where contacts are at the same level), the distal contact area is more cervical in position than the mesial contact area ([Appendix 3g](#)), and the crown outline is more convex on the distal than on the mesial surface ([Appendix 3f](#)). From the proximal views, canine crowns are wedge, or triangular, shaped ([Appendix 3o](#)). The height of contour on the facial surface is in the cervical third, and on the lingual surface is on the cingulum, which makes up the cervical third of the crown length ([Appendix 3p](#)). The remaining outline of the lingual surface (lingual ridge) is slightly concave in the middle third and is straight or slightly convex in the incisal third. Combined, the lingual outline is S-shaped, as on all other anterior teeth ([Appendix 3q](#)).

Further similarities with incisors include the following: crowns taper, narrowing from the contact areas toward the cervix ([Appendix 3e](#)); cervical lines curve more on the mesial than on the distal surface (compare mesial and distal views in [Appendix 3n](#)); and marginal ridges (as well as crowns) taper lingually from the contact areas toward the cingulum ([Appendix 3l](#)), so the crown is narrower on the lingual half than on the facial half. From the incisal view, facial outlines are less convex than lingual outlines ([Appendix 3s](#)), and the incisal edges extend from mesial to distal contact areas ([Appendix 3r](#)). Further, roots taper, narrower on the lingual half than on the facial half, and taper narrower from the cervix toward the apex ([Appendix 3h](#)), with the root tip or apex often bending to the distal ([Appendix 3i](#)). Roots are also longer than crowns ([Appendix 3k](#)) [with the root-to-crown ratio of 1.56 for maxillary canines and 1.45 for mandibular canines].

The location of incisal edge tooth wear on canines is similar to wear on incisors. Facets on the mandibular canine cusp tip and cusp ridge normally form more on the labial border, not the lingual border of the cusp ridge as occurs on the maxillary canine. If you find wear facets on the lingual surface of a mandibular canine or on the labial surface of a maxillary canine, it is probably because the teeth were not aligned with the normal overlapping of anterior teeth described in Chapter 3. Refer back to Figure 4-3 for an illustration of this concept on incisors. (Further, maxillary canines viewed incisally often have a characteristic diamond-shape wear pattern that does not occur on other anterior teeth as seen in Fig. 5-3.)

Unlike incisors where there are two types, a central and a lateral, there is only one type of canine. Therefore, type traits do not apply to canines, but arch traits are useful to distinguish maxillary from mandibular canines.

OBJECTIVES

This section is designed to prepare the learner to perform the following:

- ~ Describe the arch traits that can be used to distinguish the permanent maxillary canines from mandibular canines.
- ~ Describe and identify the labial, lingual, mesial, distal, and incisal surfaces for all canines.
- ~ Assign a Universal number to canines present in a mouth with a complete permanent dentition (or on a model or in an illustration) based on their shape and position in the quadrant.
- ~ Holding a canine, determine whether it is a maxillary or mandibular and whether it belongs on the right or left side. Then picture it within the appropriate quadrant and assign a Universal number to it.

A. CANINES FROM THE LABIAL VIEW

Examine several extracted canines and/or models as you study this section. As you examine them, hold maxillary canines with crowns down and mandibular canines with crowns up. This is the way they are oriented in the mouth. Also, while reading this section, tear out and refer to the Appendix study page 4 on canines.

A. CANINES FROM THE LABIAL VIEW

1. CANINE MORPHOLOGY FROM THE LABIAL VIEW

Along with the tooth models and the Appendix pages 3 and 4 available, refer to [Figure 5-4](#) for viewing similarities and the range of differences of canines from the labial view.

The facial side of any canine crown is formed from three labial lobes like the incisors. (The cingulum on the lingual side of the crown is from the fourth lobe.) The middle lobe on the facial forms the labial ridge ([Appendix 3c](#)), which can be quite prominent on the maxillary canine. The labial ridge runs cervicoincisally near the center of the crown in the middle and incisal thirds. Shallow depressions lie mesial and distal to the labial ridge.

See [Table 5-2](#) for a summary of the number of lobes that form canines. The labial surface of mandibular canines is more smooth and convex. A labial ridge is often present but not as pronounced as on the maxillary canines. In the incisal third, the labial crown surface is convex but slightly flattened mesial to the labial ridge and even a little more flattened distal to the ridge. (Feel it)

A. CANINES FROM THE LABIAL VIEW

2. CANINE SHAPE AND SIZE FROM THE LABIAL VIEW

The outline of the mesial half of the maxillary canine crown is broadly convex in the middle third, becoming nearly flat in the cervical third ([Appendix 4b](#)). The outline of the distal portion of this crown forms a shallow S shape, being convex in the middle third (over the height of contour or proximal contact area) and slightly concave in the cervical third.

The mandibular canine crown appears longer and narrower than the crown of the maxillary canine ([Appendix 4a](#)). [The mandibular canine crown is actually 0.4 mm longer and 0.8 mm narrower; averages from 637 teeth.] The mesial outline of the mandibular crown is almost flat to slightly convex, nearly in line with the mesial side of the root, and not projecting beyond it ([Appendix 4b](#)). This conspicuous feature is quite evident in most mandibular canines in [Figure 5-4](#) but is not seen on maxillary canines. In other words, the mesial side of the mandibular canine crown does not bulge or project beyond the adjacent root outline. The distal side of the crown may be slightly concave in the cervical third; it is convex in the incisal two-thirds. There is noticeably more of the crown distal to the root axis line than mesial to it. This often makes the lower canine crown appear to be tilted or bent distally when the root is held in a vertical position (similar to the mandibular lateral incisor just mesial to it).

A. CANINES FROM THE LABIAL VIEW

3. CANINE CUSP TIP AND INCISAL RIDGES FROM THE LABIAL VIEW

Recall that the mesial ridges are normally shorter than the distal ridges for all canines. The cusp ridges and the cusp of the maxillary canine make up nearly one-third of the cervicoincisal length of the crown, because the angle formed by the cusp ridges is relatively sharp, slightly more than a right angle (105°) ([Appendix 4c](#)). Compare this to the cusp tip of the mandibular canine, where cusp ridges form a less sharp, more obtuse (blunt) angle (120°) ([Appendix 4c](#)). The mesial cusp ridge of the mandibular canine is also almost horizontal compared to its longer distal cusp ridge, which slopes more steeply in an apical direction. Shorter, more horizontal mesial cusp ridges are seen clearly on most mandibular canines in [Figure 5-4](#). Wear on the incisal edge may alter the length of the cusp slopes, sometimes even completely obliterating the cusp, resulting in an appearance from the facial that is similar to an incisor.

A. CANINES FROM THE LABIAL VIEW

4. CANINE PROXIMAL CONTACT AREAS FROM THE LABIAL VIEW

The mesial contact area of the maxillary canine is located at the junction of the incisal and middle thirds. The distal contact area of the maxillary canine, like all anterior teeth, is in a more cervical location on the distal side than on the mesial side. It is located in the middle third, just cervical to the junction of the incisal and middle thirds (recall [Appendix 3g](#)). This is the only canine proximal contact area (mesial or distal) located in the middle third. The mesial contact area of the mandibular canine is in a more incisal position than on the maxillary canine due to its nearly horizontal mesial cusp ridge. It is in the incisal third just cervical to the mesioincisal angle. The distal contact area is, as expected, more cervical than the mesial, at the junction of the middle and incisal thirds. See [Table 5-3](#) for a summary of the location of contact areas on canines.

A. CANINES FROM THE LABIAL VIEW

5. CANINE TOOTH PROPORTIONS FROM THE LABIAL VIEW

The maxillary canine crown is nearly as long as the maxillary central incisor crown, but the root of the canine is much longer [3.5 mm longer than the average on 719 teeth] making the maxillary canine, on average, the longest tooth in the mouth ([Appendix 3k](#)). The mandibular canine is considerably larger than either of the mandibular incisors, particularly in length [by 4.1 mm] and mesiodistal width [1.3 mm]. It is, on average, the longest mandibular tooth.

A. CANINES FROM THE LABIAL VIEW

6. CANINE ROOT CONTOUR FROM THE LABIAL VIEW

The labial surface of a canine root is normally convex. The root of the maxillary canine is long, slender, and conical. The apical third is narrow mesiodistally, and the apex may be pointed or sharp. The apical third of the root often bends distally (Appendix 3i). [On 100 maxillary canines examined by Dr. Woelfel, 58 bent distally, 24 were straight, and 18 had the apical end of their roots bending slightly toward the mesial.] Only three maxillary canine roots can be seen bending mesially in Figure 5-4.

The mandibular canine root tapers apically to a somewhat more blunt apex. The apical end of the root is more often straight rather than curving toward the mesial or distal sides. [On 100 mandibular canines inspected by Dr. Woelfel, 45 had absolutely straight roots, 29 had the apical third bending mesially, and 26 bent slightly toward the distal.] Therefore, on mandibular canines, the root curvature should not be used to differentiate rights and lefts. Mandibular canine roots are shorter than the roots of maxillary canines [0.6 mm shorter on 637 teeth].

B. CANINES FROM THE LINGUAL VIEW

Refer to Figure 5-5 while studying similarities and differences of canines from the lingual view.

1. CANINE LINGUAL RIDGES AND FOSSAE FROM THE LINGUAL VIEW

The maxillary canine has a prominent lingual ridge running cervicoincisorally from the cusp to the cingulum (Appendix 4d). Mesial and distal lingual fossae lie on either side of the lingual ridge and are usually shallow. Sometimes the lingual surface of the maxillary canine is naturally smooth or worn smooth from attrition so that the lingual ridge and the two fossae on either side of it are not easily discernible. By examining a number of specimens, you will find some with considerable wear or attrition on the lingual surface, sometimes entirely obliterating the lingual ridge. With normal occlusion, the lingual surface of the mandibular canine is not subject to lingual wear as on the maxillary canine, but even without wear, the lingual ridge and fossae are normally less prominent.

B. CANINES FROM THE LINGUAL VIEW

2. CANINE CINGULUM FROM THE LINGUAL VIEW

The maxillary canine cingulum is large. Its incisal border is sometimes pointed in the center, resembling a small cusp or tubercle (seen in the far right maxillary canine in Fig. 5-4). The cingulum and the tip of the cusp are usually centered mesiodistally (seen best from the incisal view in Appendix 4e). The cingulum of the mandibular canine is low, less bulky, and less prominent than on maxillary canines. Unlike maxillary canines, the cingulum lies just distal to the root axis line. This is most apparent from the incisal view in Appendix 4e. (Recall that the distal-to-midline location of the cingulum is also apparent on maxillary central incisors and mandibular lateral incisors.)

B. CANINES FROM THE LINGUAL VIEW

3. CANINE MARGINAL RIDGES FROM THE LINGUAL VIEW

The elevated mesial and distal marginal ridges of the maxillary canines are usually of moderate size, and the lingual ridge is often most prominent. The distal marginal ridge is slightly more elevated than the mesial marginal ridge (prior to attrition). [Dr. Woelfel's dental hygiene students inspected 455 maxillary canines on dental stone casts. The lingual ridge was found to be the most elevated of the three lingual ridges 46% of the time, the distal ridge was most elevated 36% of the time, and the mesial marginal ridge was most elevated only 18% of the time.] The mesial marginal ridge (extending from the proximal contact area to the cingulum) is longer than the distal marginal ridge because of the shorter mesial cusp slope and the more incisally located mesial contact area.

The marginal ridges of mandibular canines are not prominent, and much of the lingual surface appears smooth when compared to that of the maxillary canines (an arch trait). The somewhat inconspicuous mesial marginal ridge may be longer and straighter than the shorter, more elevated, and curved distal marginal ridge. The distal marginal ridge is usually slightly more prominent or elevated than either the lingual ridge or the mesial marginal ridge. [Of 244 mandibular canines on dental stone casts inspected by dental hygiene students, the distal marginal ridge was the most prominent of the three lingual ridges on 63% of the teeth and the mesial marginal ridge was the most prominent on only 18%. The lingual ridge was most prominent only on 19% of these unworn lingual surfaces.]

B. CANINES FROM THE LINGUAL VIEW

4. CANINE ROOTS FROM THE LINGUAL VIEW

Maxillary and mandibular canine roots are usually convex on the lingual surface and are narrower mesiodistally on the lingual half than on the labial half. Therefore, it is often possible to see both mesial and distal sides of the root and one or both of the proximal longitudinal root depressions from this view.

C. CANINES FROM THE PROXIMAL VIEWS

Refer to [Figure 5-6](#) while studying the similarities and differences of canines from the mesial or distal views.

1. CANINE OUTLINE FROM THE PROXIMAL VIEWS

The wedge- or triangular-shaped maxillary canine crown from this view has a bulky (thick) cusp because of the prominent labial and lingual ridges. The mandibular canine crown is also wedge shaped but thinner in the incisal portion than the crown of the maxillary canine because of a less bulky lingual ridge. Observe this difference in cusp thickness in the canines in [Figure 5-6](#).

C. CANINES FROM THE PROXIMAL VIEWS

2. INCISAL RIDGE AND CUSP TIP OF CANINES FROM THE PROXIMAL VIEWS

The incisal ridge and cusp tip of a maxillary canine are usually located labial to the midroot axis line. The incisal ridge and cusp tip of the mandibular canine are most often located slightly lingual to the root axis line, but it may be centered over it ([Appendix 4h](#)). This is a good distinguishing trait between mandibular and maxillary canines. Observe this difference in cusp tip location (more labial on the maxillary canine and more lingual on mandibular canines) in a majority of canines in [Figure 5-6](#). Further, the distoincisor angle of the mandibular canine is slightly more lingual in position than the cusp tip because of the distolingual twist of the crown so that much of the lingual surface is visible from the mesial aspect, similar to the adjacent mandibular lateral incisors (best appreciated from the incisal view on [Appendix 4f](#)).

C. CANINES FROM THE PROXIMAL VIEWS

3. CANINE HEIGHT OF CONTOUR FROM THE PROXIMAL VIEWS

As with all teeth, the facial height of contour of the maxillary canine is in the cervical third of the crown, but it may not be as close to the cervical line as the corresponding curvature on the incisor teeth or on the mandibular canine. The labial surface is much more convex than on the incisors. (Feel it and compare the curvatures of the incisors and the canines.) The height of contour of the labial surface of the mandibular canine crown is closer to the cervical line than on a maxillary canine. There is an almost continuous crown-root outline on mandibular canines with minimal facial or lingual (cingulum) crown bulge when viewed from the proximal aspects.

This lack of discernible cervical crown bulge beyond the root facially and lingually is clearly evident in many mandibular canines in [Figure 5-6](#). This feature can be helpful when distinguishing mandibular from maxillary canines.

As with all anterior teeth, the lingual heights of contour of all canines are usually in the cervical third, on the cingulum.

C. CANINES FROM THE PROXIMAL VIEWS

4. CANINE CERVICAL LINE FROM THE PROXIMAL VIEWS

The cervical lines of all canines from the proximal views usually curve incisally quite a bit (over 2 mm on maxillary canines). As on incisors, the curvature is greater on the mesial surface than on the distal surface, but the difference is less on the canines than on the incisors. [Of the 321 maxillary canines measured by Dr. Woelfel's dental hygiene students, the mesial cervical curvature averaged 2.1 mm, with a range from 0.3 to 4.0 mm; the distal curvature averaged 1.4 mm, with a range of 0.2 to 3.5 mm. Such wide variability is not unusual.]

The mandibular canine cervical line appears to curve more incisally than on maxillary canines. The fact that the mandibular canine crown is narrower faciolingually than the maxillary canine [by 0.4 mm] and has a greater mesial cervical line curve [by 0.3 mm] accentuates the apparent greater depth of the curve [averages from 637 canines]. However, the amount of curvature of the cervical lines of the mandibular canines varied considerably [from 4.8 mm to 0.2 mm, one that was almost flat]. So, once again, a tremendous variation is evident between the same type of teeth. As with most other teeth, the cervical line curves less on the distal surface than on the mesial surface [by 0.8 mm; of the 316 mandibular canines measured, the mesial curvature averaged 2.4 mm; the distal curvature averaged 1.6 mm].

C. CANINES FROM THE PROXIMAL VIEWS

5. CANINE ROOT SHAPE AND DEPRESSIONS FROM THE PROXIMAL VIEWS

The labial outlines of the roots of maxillary and mandibular canines are often slightly convex with the lingual outline more convex, although this varies. Both maxillary and mandibular canine roots usually have vertical longitudinal (cervicoapical) depressions on the mesial and distal surfaces, and the distal depression is usually more distinct (deeper), especially on the lowers. [Mesial: on 100 maxillary canines examined by Dr. Woelfel, 70 had a longitudinal depression on the mesial root surface (six fairly deep), 23 were fiat, and only 8 had convex mesial middle third root surfaces with no depression.

On 100 mandibular canines examined by Dr. Woelfel, 88 had a longitudinal mesial root depression (28 were fairly deep), 8 were fiat, and 4 were considered to be convex. Distal: on 100 maxillary canines examined by Dr. Woelfel, 90 had a longitudinal depression on the distal surface (20 were rather deep), and only 10 had no distal root depression. Of 100 mandibular canines examined by Dr. Woelfel, 97 had a longitudinal depression on the distal surface (40 were fairly deep), and only 3 had flat distal root surfaces. None of the distal root surfaces was judged to be convex on the middle third of the root.] A summary of the location and relative depth of root depressions on canines is presented in Table 5-4.

D. CANINES FROM THE INCISAL VIEW

Refer to [Figure 5-7](#) for a comparison of similarities and differences of canines from the incisal view. To follow this description, the tooth should be held so that the incisal edge (cusp tip) is toward the observer, the labial surface is at the top, and the observer is looking exactly down the midroot axis line. You should see more of the lingual surface of the maxillary canine since the cusp tip and the cusp ridges are usually labial to the midroot axis line, and you should see more of the labial surface of mandibular canines when the cusp ridges are lingual to the midroot axis line, as seen on most canines in [Figure 5-7](#).

D. CANINES FROM THE INCISAL VIEW

1. CANINE CROWN PROPORTIONS FROM THE INCISAL VIEW

The maxillary canine crown outline is not symmetrical. The faciolingual dimension of the maxillary canine crown is slightly greater than the mesiodistal dimension [by 0.5 mm] (recall [Appendix 3d](#)). This is similar to the mandibular anterior teeth but uncharacteristic of the maxillary incisors, which are usually wider mesiodistally than faciolingually. The labiolingual dimension of the mandibular canine crown is noticeably greater than the mesiodistal measurement [by an average of 0.9 mm on 316 teeth]. This characteristic oblong faciolingual outline is seen on many mandibular canines in [Figure 5-7](#).

D. CANINES FROM THE INCISAL VIEW

2. CANINE INCISAL EDGE (CUSPTIP) CONTOUR FROM THE INCISAL VIEW

The incisal edge (made up of the cusp tip and thick mesial and distal cusp ridges) of the maxillary canine is located slightly labial to the labiolingual center of the root, and this edge is aligned almost horizontally ([Appendix 4c](#)). The cusp tip of the mandibular canine is near the center labiolingually, or it may be lingual to the center. When the tooth is held with the faciolingual axis of the cervix of the root exactly vertical, the distal cusp ridge is directed slightly lingually from the cusp tip, placing the distoincisor angle in a position somewhat lingual to the position of the cusp tip ([Appendix 4D](#)). This lingual placement of the distoincisor angle gives the incisal part of the crown a slight distolingual twist (similar to the adjacent mandibular lateral incisor). From this view, the distolingual twist of the crown appears to "bend" to follow the curvature of the dental arch.

D. CANINES FROM THE INCISAL VIEW

3. CANINE CINGULUM AND MARGINAL RIDGES FROM THE INCISAL VIEW

The maxillary canine cingulum is large and is located in the center mesiodistally ([Appendix 4e](#)). On the lingual outline of the mandibular canine, the height (crest) of contour of the cingulum is centered or slightly distal to the centerline ([Appendix 4e](#)). The mesial marginal ridge (extending from the contact area to the cingulum) appears longer than the distal marginal ridge because of the slight distal placement of the cingulum and the lingual positioning of the distal cusp ridge, placing it closer to the cingulum. This may be better appreciated from the lingual view.

D. CANINES FROM THE INCISAL VIEW

4. CANINE LABIAL CONTOUR FROM THE INCISAL VIEW

The labial outline of the maxillary canine is convex, more than either maxillary incisor, since the labial ridge is often quite prominent. The mesial half of the labial outline is quite convex, whereas the distal half of the labial outline is frequently somewhat concave, giving this distal portion of the crown the appearance that it has been "pinched in" on the facial (Appendix 4g). This observation is most helpful and is a reliable guide in determining right from left maxillary canines and is seen on many upper canines in the top row in Figure 5-7. The outline of the mandibular canine crown is more symmetrical than a maxillary canine. However, the labial crown outline mesial to the centerline is noticeably more convex, whereas the labial outline distal to the center is more fiat, or even slightly concave.

D. CANINES FROM THE INCISAL VIEW

5. CANINE LINGUAL CONTOUR FROM THE INCISAL VIEW

The lingual ridge of the maxillary canine divides the lingual surface in half with a shallow fossa on each side. This ridge and fossae are less evident on the mandibular canine.

LEARNING EXERCISES

Assign a Universal number to a handheld tooth:

A patient just had all of his permanent teeth extracted. Imagine being asked to find tooth #6 from among a pile of 32 extracted teeth on the oral surgeon's tray because you want to evaluate a lesion on the root of that canine. How might you go about it? Try the following steps:

- From a number of extracted teeth or tooth models, select the canines based on class traits.
- Determine whether the canine is maxillary or mandibular. You should never rely on only one characteristic difference between teeth to name them; rather, make a list of many traits that suggest the tooth is a maxillary canine as opposed to only one trait that makes you think it belongs in the mandible. Refer to the arch traits in Figures 5-4 through 5-7 as needed.
- If you determine that the tooth is maxillary, position the root up; if it is mandibular, position the root down.
- With the tooth aligned correctly, use characteristic traits for each surface to identify the facial surface. This will permit you to view the tooth as though you were looking into a patient's mouth.
- Finally, determine which surface is the mesial. (Refer to the right/left traits in Figs. 5-4 through 5-7 as needed.) While viewing the tooth from the facial and picturing it within the appropriate arch (upper or lower), the mesial surface can be positioned toward the midline in only one quadrant, the right or left.
- Once you have determined the quadrant, assign the appropriate Universal number for the canine in that quadrant. For example, the canine in the upper right quadrant is tooth #6.

Probably the most conspicuous variation in canine teeth is found in the mandibular canine. For example, although it is rare to find a maxillary canine tooth with the root divided, this division is known to occur. The division results in labial and lingual roots and may be split only in the apical third, or it may extend into the cervical third of the root (Fig. 5-8).

Observe the enormous variation in size and shape among several maxillary and mandibular canines in Figure 5-9. Referring to the measurements of 637 canines in Table 5-1 under the range column, maxillary canine crowns from shortest to longest varied by 5.4 mm, root length differed by 17.7 mm, and overall length differed

by 18.4 mm. In the 1962 issue of the Journal of the North Carolina Dental Society (46:10), there was a report of an extraction, without incident, of a maxillary left canine 47 mm long. On mandibular canines, crown length, root length, and overall length ranges varied by 9.6, 12.7, and 18.4 mm, respectively. Can you imagine one mandibular canine with a crown 9.6 mm longer than another one? The shortest mandibular canine (cusp tip to root apex) was only 16.1 mm long. Two of the mandibular canine crowns in Figure 5-9 are that long. See if you can spot these teeth.

A maxillary canine with an unusual notch on its mesial cusp slope is seen in Figure 5-10. An unusual canine with a shovel-shaped lingual surface is evident in Figure 5-11. Other anomalies will be described in Chapter 12. Perhaps the most unique canines of all occur on the male Babirusa (type of wild boar) seen in Figure 5-12. Its two enormous maxillary canines curve backward, piercing the upper lip and bony snout on each side. Then they curve in a large arc upward, backward, and finally down toward the forehead. These unusual maxillary canines serve only to protect the boar's eyes and upper face. The Babirusa's mandibular canines are also very large and tusk-like, and curve up and back, possibly serving to protect the side of his face and for fighting or piercing food when his jaw is opened wide.

LEARNING QUESTIONS

For each trait described below, indicate the letter of the best response from the five selections provided. Each trait has only one best answer.

- a. Maxillary central incisor
- b. Maxillary canine
- c. Mandibular canine
- d. All of the above
- e. None of the above

1. This tooth exhibits less cervical line curvature on the distal aspect than on the mesial aspect,
2. The cingulum is centered mesiodistally,
3. There is an almost continuous crown-root outline on the mesial surface of this tooth,
4. The mesial contact area is located more incisally than the distal contact area on the same tooth,
5. The cusp tip is positioned lingual to the midroot axis line from the proximal view.
6. Mamelons could be observed on this tooth,
7. On which tooth is the cusp angle most acute?
8. The mesiodistal width of this tooth is greater than its labiolingual width,
9. The mesial and distal marginal ridges are aligned more vertically than horizontally on the lingual surface,
10. The tooth (teeth) develop(s) from four lobes,
11. The tooth (teeth) develop(s) from three lobes,